

WHAT IS CLAIMED IS:

1. A black toner comprising toner particle containing at least a binder resin, carbon black and a releasing agent, wherein:

the toner particle has weight-average particle diameter of 3.5 to 8.0 μm ;

total value of acid value and hydroxyl value of the toner is 30 to 75 mgKOH/g;

average circularity of particles contained in the toner having circle-equivalent diameter of 2 μm or more is 0.915 to 0.960;

loss tangent $\tan \delta$ (10^3 to 10^4 Hz) of the toner is represented by the following expression:

$$\tan \delta (10^3 \text{ to } 10^4 \text{ Hz}) \leq 0.0060$$

where the loss tangent $\tan \delta$ is represented by $\varepsilon''/\varepsilon'$ where ε'' denotes dielectric loss factor and ε' denotes dielectric constant, and $\tan \delta$ (10^3 to 10^4 Hz) denotes the loss tangent in a frequency range of 10^3 to 10^4 Hz; and

a ratio of $\tan \delta$ (10^5 Hz) to $\tan \delta$ (5×10^4 Hz) is represented by the following expression:

$$1.05 \leq \tan \delta (10^5 \text{ Hz}) / \tan \delta (5 \times 10^4 \text{ Hz}) \leq 1.40$$

where $\tan \delta$ (10^5 Hz) denotes loss tangent at the frequency of 10^5 Hz and $\tan \delta$ (5×10^4 Hz) denotes loss tangent at the frequency of 5×10^4 Hz.

2. The black toner according to claim 1, wherein the toner has a peak temperature of maximum peak endothermic peak of 60 to 95°C in a temperature range of 30 to 200°C of an endothermic curve

of differential scanning calorimetry (DSC) measurement.

3. The black toner according to claim 1 or 2, wherein the toner has molecular weight distribution whose main peak is in a range of 3,000 to 40,000 in gel permeation chromatography (GPC) of tetrahydrofuran (THF) extraction, and has M_w/M_n of 70 or more where M_w denotes weight-average molecular weight and M_n denotes number-average molecular weight.

4. The black toner according to any one of claims 1 to 3, wherein the carbon black dispersed in the toner particles has dispersed particle size of 0.50 μm or less.

5. The black toner according to any one of claims 1 to 4, wherein the binder resin is a hybrid resin component having a polyester resin unit and a vinyl polymer unit.

6. The black toner according to any one of claims 1 to 4, wherein the binder resin is one of the hybrid resin component having the polyester resin unit and the vinyl polymer unit, and a mixture of the hybrid resin component and a polyester resin.

7. The black toner according to any one of claims 1 to 4, wherein the binder resin is a mixture of a polyester resin and a vinyl polymer, or a mixture of a hybrid resin component having a polyester resin unit and a vinyl polymer unit and the vinyl polymer.

8. The black toner according to any one of claims 1 to 4, wherein the binder resin is a mixture of a polyester resin, a hybrid resin component having a polyester resin unit and a vinyl polymer unit, and a vinyl polymer.

9. The black toner according to any one of claims 1 to 8, wherein the toner comprises 1 to 20 parts by mass of the releasing agent based on 100 parts by mass of the toner.

10. The black toner according to any one of claims 1 to 9, wherein the releasing agent contains a hydrocarbon wax having a styrene unit.

11. The black toner according to any one of claims 1 to 10, further comprising an organometallic compound.

12. The black toner according to any one of claims 1 to 11, wherein the toner particles contains 2 to 10 parts by mass of the carbon black based on 100 parts by mass of the binder resin.